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PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Igor A. Krichtafovitch and Robert L. Fuhriman, Jr.
Serial No.: 09/419,720 ✓
Filed: 10/14/1999 ✓
For: Electrostatic Fluid Accelerator
Group Art Unit: 2821 ✓
Examiner: Ephrem Alemu
Attorney Docket No.: PFUHRI

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THE ASSISTANT COMMISSIONER FOR PATENTS
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AMENDMENT

SIR:

This paper is presented in response to the Office action mailed on December 21, 2000.

Please, amend the above-entitled application as follows:

IN THE CLAIMS

In claim 2 on line 2, cancel "the" and insert --a-- in place thereof.

In claim 3 on line 2, after "exciting" insert --electrodes-- .

In claim 10 on line 2, cancel "the" and insert --a-- in place thereof.

In claim 15 on line 2, cancel "the" and insert --a-- in place thereof.

In claim 33 on line 2, cancel "the" and insert --a-- in place thereof.

Amend claim 5 as follows:

1 5 (amended). The electrostatic fluid accelerator as recited in claim 4, further comprising:

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2 one or more additional [electrostatic fluid accelerators as recited in claim 4,] sets
3 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
4 [each of said additional electrostatic fluid accelerators being located downstream, with
5 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
6 accelerator]; and

7 at least one collecting electrode located between at least two consecutive sets [one
8 pair of said electrostatic fluid accelerators].

Amend claim 6 as follows:

1 6 (amended). The electrostatic fluid accelerator as recited in claim 3, further comprising:

2 one or more additional [electrostatic fluid accelerators as recited in claim 3,] sets
3 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
4 [each of said additional electrostatic fluid accelerators being located downstream, with
5 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
6 accelerator]; and

7 at least one collecting electrode located between at least two consecutive sets [one
8 pair of said electrostatic fluid accelerators].

Amend claim 8 as follows:

1 8 (amended). The electrostatic fluid accelerator as recited in claim 7, further comprising:

2 one or more additional [electrostatic fluid accelerators as recited in claim 7,] sets
3 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
4 [each of said additional electrostatic fluid accelerators being located downstream, with
5 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
6 accelerator]; and

7 at least one collecting electrode located between at least two consecutive sets [one
8 pair of said electrostatic fluid accelerators].

Amend claim 9 as follows:

1 9 (amended). The electrostatic fluid accelerator as recited in claim 2, further comprising:
2 one or more additional [electrostatic fluid accelerators as recited in claim 2,] sets
3 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
4 [each of said additional electrostatic fluid accelerators being located downstream, with
5 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
6 accelerator]; and

7 at least one collecting electrode located between at least two consecutive sets [one
8 pair of said [electrostatic fluid accelerators].

Amend claim 12 as follows:

1 12 (amended). The electrostatic fluid accelerator as recited in claim 11, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 11,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 13 as follows:

1 13 (amended). The electrostatic fluid accelerator as recited in claim 10, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 10,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 20 as follows:

1 20 (amended). The electrostatic fluid accelerator as recited in claim 19, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 19,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 21 as follows:

1 21 (amended). The electrostatic fluid accelerator as recited in claim 18, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 18,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 23 as follows:

1 23 (amended). The electrostatic fluid accelerator as recited in claim 22, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 22,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 24 as follows:

1 24 (amended). The electrostatic fluid accelerator as recited in claim 17, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 17,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with

6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 28 as follows:

1 28 (amended). The electrostatic fluid accelerator as recited in claim 27, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 27,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 29 as follows:

1 29 (amended). The electrostatic fluid accelerator as recited in claim 26, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 26,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said [electrostatic fluid accelerators].

Amend claim 31 as follows:

1 31 (amended). The electrostatic fluid accelerator as recited in claim 30, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 30,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 32 as follows:

1 32 (amended). The electrostatic fluid accelerator as recited in claim 25, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 25,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 36 as follows:

1 36 (amended). The electrostatic fluid accelerator as recited in claim 35, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 35,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 37 as follows:

1 37 (amended). The electrostatic fluid accelerator as recited in claim 34, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 34,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 40 as follows:

1 40 (amended). The electrostatic fluid accelerator as recited in claim 39, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 39,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 41 as follows:

1 41 (amended). The electrostatic fluid accelerator as recited in claim 38, further
2 comprising:

3 one or more additional [electrostatic fluid accelerators as recited in claim 38,] sets
4 of a multiplicity of closely spaced corona electrodes and at least one exciting electrode
5 [each of said additional electrostatic fluid accelerators being located downstream, with
6 respect to the desired direction of fluid flow, from said preceding electrostatic fluid
7 accelerator]; and

8 at least one collecting electrode located between at least two consecutive sets [one
9 pair of said electrostatic fluid accelerators].

Amend claim 42 as follows:

1 42. An electrostatic fluid accelerator, which comprises:
2 [any] a corona discharge device [that is well known in the art for moving a fluid];
3 one or more additional corona discharge devices [that are well known in the art
4 for moving a fluid], each of said additional corona discharge devices being located
5 downstream, with respect to a [the] desired direction of fluid flow, from [said] a
6 preceding corona discharge device; and

7 at least one collecting electrode located between at least one pair of said corona
8 discharge devices [electrostatic fluid accelerators].

REMARKS

Oath/Declaration

The Examiner has commented:

A new oath or declaration is required because the declaration is executed for a single inventor not for plural inventors. The Examiner suggests changing "I" to --We-- or executing a separate Oath/Declaration for each inventor. The wording of an oath or declaration cannot be amended. If the wording is not correct or if all of the required affirmations have not been made or if it has not been properly subscribed to, a new oath or declaration is required. The new oath or declaration must properly identify the application of which it is to form a part, preferably by application number and filing date in the body of the oath or declaration. See MPEP §§ 602.01 and 602.02.

The Applicants respectfully disagrees with the Examiner's conclusion. Applicants used form 1-1 found in the respected *Patent Office Rules and Practice* by Dr. Lester Horwitz. In order to minimize effort, however, the Applicants have each executed and enclosed separate declarations, as courteously suggested by the Examiner.

Claim Rejections

35 U.S.C. § 112

The Examiner has said:

Claims 1, 2, 3, 5, 6, 8-10, 12-16, 18, 20, 21, 23, 24, 26, 28, 29, 31-33, 36, 37 and 40-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite in that it fails to point out what is included or excluded by the claim language. These claims are an omnibus type claims.

In claims 1 and 14, there is no clear interrelationship of the corona and exciting electrodes with a power supply. There must be a recitation of a power supply in order to define a complete and operable accelerator.

The Applicants respectfully submit that one need not recite every element. John L. Landis on page 54 of his *Mechanics of Patent Claim Drafting*, second edition, Practising Law Institute, 1974, "In writing broad claims in electrical cases, it is desirable where possible to focus on what combination a prospective infringer might sell, and to avoid including as elements conventional items such as power sources or batteries which such person might not include with the device. This theory applies to all types of cases. One would always rather catch a direct infringer under 35 U.S.C. § 271(a) than a contributory one under 35 U.S.C. § 271(c)."

Applicants respectfully believe that all requisite structural connections between the elements in claims 1 and 14 have been provided.

Claim 3 was amended to insert the inadvertently omitted word "electrodes."

The Examiner continues:

In claims 2, 3, 10, 15, 16, 18, 26 and 33 the recitation of the limitation "the voltage" in line 2, respectively makes the claim being indefinite because there is insufficient antecedent basis for this limitation in each claim.

All these claims have either been amended to recite "a voltage," instead of "the voltage," in order to eliminate any lack of antecedent basis or now have proper antecedent basis.

The Examiner then says:

In claims 5, 6, 8, 9, 12, 13, 20, 21, 23, 24, 28, 29, 31, 32, 36, 37, 40 and 41, the recitation of "one or more additional electrostatic fluid accelerators as recited in claim x", where x represents the appropriate claim in which the above claims depends upon, prevents the scope from being clear because it appears to be reciting having a multiple accelerator system. This type of language fails to further limit the claim that depends on. In other words, Claim 1, for example, recites a single accelerator, and Claim 5 recites an additional accelerator. That additional one is not part of the one recited in Claim 1. A system rather, is implied here.

Each of these claims has been amended explicitly to include one or more sets of the same elements as comprise the structure of the particular claim upon which a given one of these claims depends, as well as at least one collecting electrode located between at least two consecutive set. Each of these claims, therefore, adds structure to the claim upon which it depends. Since this additional structure is added to the structure of the claim upon which the more complex claim depends, the more complex claim adds additional limitations, or further limits, the claim upon which it depends.

These amendments are, however, for the purpose of clarity and do not represent additional limitations to the originally presented claims. In fact, in many cases they are broader than the originally presented dependent claims

Next the Examiner states:

In Claim 42, it is improper to refer to any structure in the prior art. The statute requires that the invention be set forth in clear terms. Thus, the language, "any . . . that is well known in the art . . ." is not definite. Additionally, an accelerator is an element of a "corona discharge device", rather than the other way around, recited in this claim.

Claim 42 has been amended to eliminate the language to which objections have been made.

35 U.S.C. § 102

The Examiner asserts:

Claims 1-45 are rejected under 35 U.S.C. 102(b) as being anticipated by Gourdine (US 3,582,694).

Re claims 1, 2, 3, 5, 6, 8-10, 12, 13, and 43-45, Gourdine discloses an electrogasdynamic system comprising plurality of electrostatic fluid accelerators (electrogasdynamic (EGD) stage) that are located downstream, with respect to the

desired direction of fluid flow, from the preceding electrostatic fluid accelerator (Figs. 1, 3; Col. 3, lines 62-65); and

at least one collecting electrode⁽²²⁾ located between at least one pair of the electrostatic fluid accelerators (22) (Col. 4, lines 1-11); wherein each electrostatic fluid accelerator comprises: a multiplicity of closely spaced corona electrodes (18);

at least one exciting electrode (attractor electrode, 20) asymmetrically located between the corona electrodes; and

a high voltage power source for supplying power to the electrodes (49) (Fig. 1; Col. 5, line 37 – Col. 6, line 16; wherein the voltage between the corona electrodes and the exciting electrodes is maintained between the corona onset voltage and the breakdown voltage).

Re claims 4, 7 and 11, Gouridine further shows that the exciting electrode is a plate that extends downstream with respect to the desired direction of fluid flow (Fig. 1, Col. 3, line 46-48).

With respect to claims 1 through 13 of the present invention the asymmetrical location of at least one exciting electrode between the corona electrodes is critical. As stated in lines 13 through 16 on page 6 of the present application:

In order to cause ions to create fluid flow, either the exciting electrode must be asymmetrically located between the adjacent corona electrodes (in order to create an asymmetrically shaped electric field that, unlike a symmetrical field, will force ions in a preferred direction) or there must be an accelerating electrode.

Yet, the Applicants must respectfully state that nowhere in the specification, drawings, or claims of the Gouridine patent (United States patent no. 3,583,694) can they locate any indication that Gouridine has located his attractor electrode 20 asymmetrically with respect to the corona electrodes. Thus, Applicants respectfully submit that claims 1 through 13 are patentably distinct from Gouridine.

The preceding is logical because Gourdine did not, and has not, created an accelerator. He uses a corona discharge to emit ions and introduce electrical charges into a passing gas that has already been accelerated by an outside source.

Claims 2 through 6 are further independently patentable over Gourdine, Applicants respectfully submit, because they employ a flexible top high-voltage power supply which Gourdine does not.

Furthermore, claims 4, 5, 7, 8, 11, and 12 include a plate or plates (Some claims use only the singular; but in all claims, under common patent construction and the intent of the Applicants, the singular includes the plural. The difference in language is only stylistic.) that extend downstream with respect to the desired direction of fluid flow.

The purpose for this is explained in lines 12 through 14 on page 12 of the present application:

To assure that more ions and, consequently, more fluid particles, flow downstream, the exciting electrode can be constructed in the form of a plate that extends downstream with respect to the desired direction of fluid flow.

The attractor electrodes of Gourdine extend both downstream and upstream and, therefore, cannot accomplish the desired purpose.

Additionally, for claims 5, 6, 8, 9, 12, and 13 there is an additional patentable distinction over Gourdine. Gourdine has a collecting electrode only after all his stages, not between any two stages. Lines 1 through 3 in column 4 of Gourdine clarify:

At the downstream end **16** of the converter, each flow path has associated therewith a collector electrode **22** which also extends laterally of the flow path.

Therefore, the collecting electrode of Gourdine cannot collect any charged particles on their way from one stage to another, the essential aspect of this element in the present application as explained in lines 15 through 22 on page 12 of the application:

Finally, as discussed above, in order to achieve the greatest flow of fluid, multiple stages of corona discharge devices, and preferably the Electrostatic Fluid Accelerator of the present invention, are used with a collecting electrode placed between each stage. The collecting electrode has opposite electrical polarity to that of the corona electrodes and is designed to preclude substantially all ions and other electrically charged particles from passing to the next stage, where they would tend to be repelled and thereby impair the movement of the fluid. Preferably, the collecting electrode is a wire mesh that extends substantially across the intended path for the fluid particles.

Another patentable distinction for claims 10 through 13 is that these claims assert that the voltage between the corona electrodes and the exciting electrodes is variable, even outside the range between the corona onset voltage and the breakdown voltage. Applicants respectfully believe this is not stated to be true for the device of Gourdine.

Concerning claims 43 through 45, Gourdine, Applicants respectfully believe, never even discusses a flexible top high-voltage power supply.

The Examiner next declares:

Re claims 14-18, 20, 21, 23, 24-26, 28, 29, 31-34, 36-38, 40 and 41, Gourdine discloses an electrogasdynamic system comprising plurality of electrostatic fluid accelerators (electrogasdynamic (EGD) stage) that are located downstream, with respect to the desired direction of fluid flow, from the preceding electrostatic fluid accelerator (Figs. 1, 3;; ;Col. 3, lines 62-65);

at least one collecting electrode located between at least one pair of the electrostatic fluid accelerators (22) (Col. 4, lines 1-11); wherein each electrostatic fluid accelerators comprises: a multiplicity of closely spaced corona electrodes (150) (Fig. 8);

at least one exciting electrode (attractor electrode, 149) asymmetrically located between the corona electrodes (Fig. 8);

at least one accelerating electrode (second attractor electrode, 153) (Fig. 8; Col. 17, line 69 – Col. 18, line 23; wherein the accelerating electrode is either attracting or repelling electrode); and

a voltage source for supplying power to the electrodes (154) (Fig. 8; Col. 5, line 37 – Col. 6, line 16; wherein the voltage between the corona electrodes and the exciting electrodes is maintained between the corona onset voltage and the breakdown voltage).

Re claims 19, 22, 27, 30, 35 and 39, Gourdine further shows that the exciting electrode is a plate that extends downstream with respect to the desired direction of fluid flow (Fig. 1, Col. 3, line 46-48).

Claim 14 includes “a multiplicity of closely spaced corona electrodes,” and all these other claims depend upon claim 14.

The Examiner has utilized only Fig. 8 and column 17, line 69 through column 18, line 23 in his analysis. Nowhere there is a multiplicity of closely spaced corona electrodes discussed. Applicants respectfully submit, therefore, that the claims in question are patentably distinct over Gourdine.

The use of the flexible top high-voltage power supply in claims 18, 19, 20, 21, 26, 27, 28, and 29 further, Applicants respectfully believe, show that such claims are patentably distinct over Gourdine, as explained above.

Applicants also respectfully assert that claims 19, 20, 22, 23, 27, 28, 30, 31, 35, 36, 39, and 40 are also patentably distinct from Gourdine because of the distinction of the extension of their plates for exciting electrodes only downstream, as discussed above.

Also, Applicants respectfully submit that for claims 20, 21, 23, 24, 28, 29, 31, 32, 36, 37, 40, and 41 the collecting electrode between at least one pair of sets provides a further patentable distinction over Gourdine, as explained above.

Another patentable distinction for claims 33 through 41 is that these claims assert that the voltage between the corona electrodes and the exciting electrodes is variable, even outside the range between the corona onset voltage and the breakdown voltage. As explained above, Applicants respectfully submit that Gourdine does not do this.

Claim 15 requires that the voltage between said corona electrodes and said accelerating electrodes is maintained between the corona onset voltage and the breakdown voltage. Applicants respectfully indicate that Gourdine does not do this and that for such reason claim 15 is further patentably distinct over Gourdine.

Concerning claims 25 through 32 and 38 through 41, each of these claims indicates that the accelerating electrode is a repelling electrode; and Applicants respectfully submit that nowhere does Gourdine even discuss a repelling electrode. For this additional reason, claims 25 through 32 and 38 through 41 are, Applicants respectfully believe, further patentably distinct from Gourdine.

Finally, the second attractor electrode **153** of Gourdine is, as shown and described, not capable of functioning as an attracting electrode as contemplated by the present application.

Lines 17 through 19 on page 6 of the present invention explain:

Preferably, in the case of an accelerating electrode, such accelerating electrode is an attracting electrode placed downstream from the corona electrodes in order to cause the ions to move in the intended direction.

Gourdine's second attractor electrode is described in lines 4 through 5 of column 18 as “. . . having surfaces **153a**, **153b** exposed to the flow in the secondary channels **147**.” Figure 8 depicts the second attractor electrode as having sharp edges (flash or flat surfaces). Lines 19 through 21 in column 18 of Gourdine further declare, “It may also be remarked here that the second attractor electrode may be replaced with a thin wire similar to the corona wire **150**”

Having sharp edges or having the same geometry as the corona electrodes, the second attractor electrode would unavoidably give rise to an electric field around its edges. It would do so to the same degree as the corona electrode does. Therefore, when voltage is applied, a corona discharge will occur at both the corona electrodes and the second attractor electrode. Ions would be emitted from the corona electrode and move toward the second attractor electrode while, simultaneously, ions of opposite polarity would be emitted from the second attractor electrode and move toward the corona electrode, *i.e.*, in the opposite direction to the desirable flow of gas.

This is reasonable for Gourdine because his device is not designed to accelerate a gas.

Yet, Applicants respectfully submit, this fact further patentably distinguishes claims 17 through 24 and claims 34 through 37 from Gourdine.

Applicant respectfully requests the Examiner to allow claims 1 through 45.

DATED this 21st day of June, 2001.

Respectfully,

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